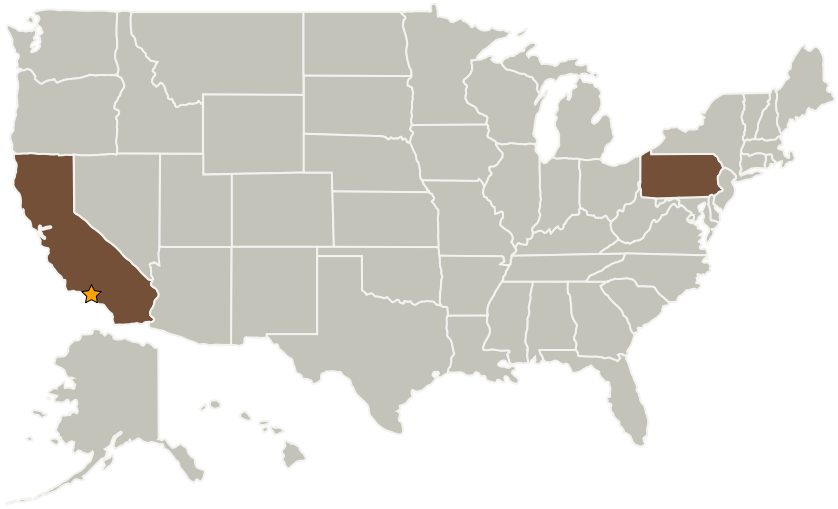
Micromachined Piezoelectric Actuators for Cryogenic Adaptive Optics, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

TRS Technologies proposes micromachined single crystal piezoelectric actuator arrays to enable ultra-large stroke, high precision shape control for large aperture, lightweight and cryogenic adaptive optics structures for future NASA Science and communications applications. The proposed concept will advance the state-of-art actuators for deformable mirrors considering the excellent cryogenic properties (with d33 and d31 at 30K similar or higher than that of PZT at room temperature) of single crystal piezoelectrics, large stroke and high actuator density. In this Phase I project, TRS will investigate the feasibility of using micromachined single crystal piezo actuator array for deformable mirrors. Single crystal piezoelectric microactuator arrays will be fabricated and characterized at temperature from 20 K to 300 K. Driving electronics for piezo actuator array, and DM modeling incorporating piezo microactuators will be investigated in Phase I as well. In Phase II, optimized single crystal piezoelectric actuators will be designed, fabricated, characterized and integrated into a deformable mirror structure for full evaluations.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
TRS Ceramics, Inc.	Supporting Organization	Industry	State College, Pennsylvania

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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California	Pennsylvania

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Xiaoning Jiang

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems